LYMAN JAYS MANUAL

KCNO FM

EDI MEDIA INC.

CCA ELECTRONICS CORPORATION

FM 25,000 D/DS 25KW

BROADCAST TRANSMITTER

INSTRUCTION MANUAL

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PRELIMINARY INSTRUCTION MANUAL

CCA FM-25,000 D/DS 25KW FM

BROADCAST TRANSMITTER

(2-76)

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FM-25,000 D/DS

TECHNICAL SPECIFICATIONS

Performance Specifications

Type of Emission	FM 3 FM
Frequency Range (Specify)	50 to 150 Mc
Rated Power Output	25KW, 20KW
RF Output Impedance	50 ohms (3 1/8")
Input Impedance (Audio)	See Exciter Specs.
Amplitude vs. Frequency	See Exciter Specs.
Carrier Frequency Stability	See Exciter Specs.
Modulation Capability	See Exciter Specs.
Audio Frequency Distortion	See Exciter Specs.
FM Noise below ± 75 Kc	65 db
AM Noise, RMS	55 db below carrier
Harmonic Attenuation (Ratio of any single harmonic to carrier)	At least 80 db

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Electrical Specifications

Power Line Requirements

Voltage (specify)	208/230V, 50/50 cycle, 3 Phase
Slow Line Variations	± 5%
Rapid Line Variations	± 3%
Power Consumption	35KW (Approx.)

Mechanical Specifications

Transmitter - overall dimensions

Width	68"
Height	76"
Depth	34"
Gross Weight	2200 lbs. (Approx.)
Maximum Atlitude	7500 Feet
Ambient Temperature	0° to 50° C

SECTION I

GENERAL

The CCA FM-25, 000D/DS, 25, 000 Watt FM Broadcast Transmitter consists essentially of an independent 3KW Transmitter and a 25KW Amplifier. The 3KW Transmitter can be any FCC type approved transmitter, but the type # FM-25, 000DS applies to the CCA FM-3000D/DS as a driver unit. The amplifier cabinet is completely independent of the driver insofar as control circuitry and power supply is concerned. The only interconnection between the two cabinets is the RF cable which is interconnected between the two. Since the amplifier utilizes a zero bias triode, in the absence of RF drive, the final stage will not be over-dissipated. Thus, the driver may be disconnected and full voltage may be applied to the amplifier and it will not be injurious to the equipment.

The intent of this transmitter is to achieve the maximum effective radiated power permitted by the FCC, consistent with the minimum antenna aperature. Although the transmitter has reserve to produce 30KW, it is designed as a basic 25KW transmitter which in turn, will permit operation in domestic use, without the necessity for having a first class operator at the station on a full-time basis. The transmitter is designed to operate on monaural, stereo as well as simultaneous SCA.

MECHANICAL

The CCA FM-25, 000D/DS is housed in two (2) medium sized modern cabinets, which occupies approximately eighteen (18) square feet of floor space. Associated with these cabinets, and included with the equipment is a harmonic filter and directional coupler, as well as a 3 1/8" elbow that are installed in the output transmission line on top of the power amplifier cabinet. There also exists an interconnecting 1 5/8" cable arrangement between the cabinets. The system is designed such that the driver

SECTION I

unit, when viewed from the front, is located on the left while the amplifier is located to the right. If the customer desires a different arrangement, this can be achieved, but there must be a different length of interconnecting cable between the two (2) cabinets supplied.

The transmitter is so designed that normal operation is achieved without any requirement for entering the equipment save for opening the front doors. This eliminates the problems of strangers inadvertently operating switches. Panel controls are available at a convenient hip level.

Within the transmitter exists circuit breakers and slo blo fuses for back-up protection, fast acting reliable overload relays, and toggle switches for preliminary tuning procedures. In addition, all of the RF tuning controls are available from the front panel, and have associated with them, calibrated control knobs. Thus, the operator will always know whether some stranger has inadvertently adjusted the controls.

Four and a half inch modern meters are prominently displayed on the front meter panel. These meters indicate all of the major functions that are required for the FCC. Access to these meters are provided by the hinged, meter panels on both cabinets. In addition, an incident and reflected power output meter exists on both cabinets to reflect the termination of both the driver unit as well as the final amplifier.

Vertical panel construction is used throughout the equipment to minimize the effect of blind spots created with shelf construction.

Two hundred percent (200%) in cooling is utilized in the equipment. The transmitter is designed to operate at 7500 feet elevations. Thus, the more

normal operation at lower elevations are extremely conservative. All air enters the equipment through the rear filtered doors. The outlet air is available at the top of the cabinet.

There is no external vault with the FM-25,000D/DS. All components are mounted within the two (2) cabinets save for the external harmonic filter and directional coupler.

ELECTRICAL

Refer to the instruction book on the CCA FM-3000D/DS, as well as the instruction book on the CCA FM-10DS for information that relates to the driver unit. The information contained herein applies only to the amplifier section.

Referring to the schematic of the amplifier, it can be seen that it contains a single RF stage. The heart of the amplifier is the zero bias triode type 3CX15,000A7.

The RF power from the driver unit is accepted through a double Pi input circuit. Adjustment of these two tuning controls, which are variable inductances of the Pi network, are able to achieve a perfect termination of the driver unit.

The output circuit of the RF stage contains two variable inductances. Both variable inductances are related to shunt circuitry. One variable inductance serves as a fine tuning control, while the variable inductance serves as a loading control. It should be noted that there are no variable capacitors in both the input and output circuits. This reflects increased stability in the circuitry.

SECTION I

It should also be noticed that the control grid of this stage is connected directly to DC ground. This grounded grid configuration together with direct DC grounding assures perfect isolation between the input and output circuits and eliminates any requirement for neutralization controls.

The output of the transmitter has connected to it, a 40 db low pass harmonic filter. This fact combined with the fact that the attenuation in the output circuit of the FM-25, 000DS is of the order of 50 db, assures compliance with the FCC specification for harmonic attenuation.

The output of the harmonic filter has a directional coupler which monitors both the incident and reflected power associated with the output of the transmitter. A front panel reads these powers.

The amplifier also has a cathode current meter. The difference between these two current values represents the grid current. Both meters are prominently displayed on the front panel.

The control circuit of the equipment is such that the front panel switches operate contactors which in turn supply the high voltage to the PA stage. This design permits remote control operation.

There is only one power supply in the transmitter. This is the high voltage power supply. It is a three phase, full wave rectifier which utilizes silicon rectifiers with three percent (3%) PIV and one thousand percent (1000%) current reserve. Overload relays exist in the common return of the power as well as the cathode of the power amplifier. The operation of these overload relays operate auxiliary contactors which in turn, remove the plate voltage from the transmitter.

The system incorporates a three cycle, overload recycling system such that in the event of a momentary fault, the plate voltage will automatically be restored for three times. If the fault still persists, the transmitter will not have any plate voltage unless manually reset by the operator.

SECTION I

The transmitter incorporates facilities for remote metering the PA plate voltage and plate current. With the introduction of a diode detector kit attached to the monitor probe, power output can also be monitored. Since the transmitter contains an independent driver and essentially, a linear amplifier, there is no remote power output adjustment in the amplifier. The remote power output adjustment is accomplished by varying the RF drive to the final stage through the facilities available in the driver unit.

SECTION II

THEORY OF OPERATION

3KW Driver: Refer to the instruction book on the type approved 3KW Transmitter used in the overall system. In particular, refer to the CCA FM-3000D/DS Transmitter Instruction Book.

Power Amplifier: The final amplifier of the FM-25, 000D/DS utilizes a zero bias, high mu triode identified by the Eimac type #3CX15, 000A7. This ceramic triode has a power gain of approximately twenty (20) in grounded grid configuration. However, with the introduction of substantial cathode resistance, the operating bias of the stage is increased to a point where the drive required is approximately 85%. The tube is so rated, that with the grid connected directly to DC ground, without RF drive, the plate dissipation cannot be exceeded. The ability to ground the grid eliminates the requirement for RF bypasses or bias supply and assures perfect isolation between input and output circuits. No neutralization is required for this stage. The output circuit of the power amplifier utilizes two (2) variable inductances, one for tuning and one for loading. They are both shunt inductances. They have been designed to operate in excess of 7500 feet without exhibiting any corona or instability problems.

Control Ladder: Referring to the schematic, it can be seen that the three phase power line, 208/230V, 50/60 cycles, is supplied to the main input terminal board, TB1. The application of the circuit breaker CB2 applies voltage to the control transformer T1. The application of the filament switch S2 closes the start contactor K15. The contact of this relay operates two (2) blowers BL1 and BL2 which operate in parallel. After sufficient pressure has been generated such that the air flow switch S9 is closed, the air interlock light I2 will register. Assuming that the PA box is secured

such that S10 interlock is closed, the filament contact of K16 will close. The contacts of K16 will permit voltage to be applied. Assuming that circuit breaker CB3 is closed, to the time delay relay K1. The 230V is also applied to the primary of the filament transformer T3. The value of this voltage can be adjusted by the front panel filament rheostat. It can be varied approximately five to ten percent. After the time delay has had voltage applied to it for two minutes, its contacts will close and permit the control circuit related to the high voltage power supply to be continued. Assuming that both the cabinet back doors and meter panels are secure, the application of the front panel plate switch S4 will apply voltage to the low power contactor K17. These contacts are such that the primary connection is connected essentially as a "Y" which represents a low step up voltage in the plate transformer. The output voltage in this condition is approximately 4000V.

By operating the high power switch S3, the one second time delay K9 will operate and within one second after its application, the voltage will be disconnected from K16 low power contact and voltage applied to K17, the high power contact. This will result in a delta connection on the primary of the high voltage plate transformer T2. The resultant plate voltage will be approximately 7500V. It should be noted that even if the transmitter were to have its plate voltage applied with the plate voltage switch in the high position, the transmitter would still operate initially at low voltage and then within one second, go to high voltage. This reduces the charging current required to charge the capacitors in the power supply.

The transmitter control system also incorporates a three cycle, recycling system. In the event of an overload, the contacts of K10 or K12 will operate. When this relay closes, its contacts will open the control ladder and plate voltage will be removed. An auxiliary contact of relay K3 keeps this relay closed until the one second time delay relay K4 operates.

When this relay operates, the first holding relay K3 opens the circuit that operates the overload auxiliary relay K2. Thus, the control circuit of the transmitter is restored to operation and in the event of no re-occurances of failure within the next sixty (60) seconds, the overload clearing relay K8 will operate and restore the equipment to its pre-overload condition. On the other hand, if a second fault should occur within sixty (60) seconds, the contacts of K5 will serve as a path for operating overload auxiliary relay K2 and thus, the plate voltage will be removed again from the transmitter. After one second, the time delay relay K6 will operate and the second holding contactor K5 will interrupt the circuit which completed the overload auxiliary K2 circuit. Thus, the plate voltage will again be restored to the transmitter. In the event of a third fault within sixty (60) seconds, the relay K7 will operate which will maintain the overload auxiliary relay closed, until the equipment is manually reset by operation of the overload relay switch S5 or in the remote position, the remote overload reset switch. It should also be noted that associated with the overload circuit are auxiliary overload relays K11 and K13. These relays have neon lamps which operate and stay lit in the event of an overload in either the high voltage or PA circuitry. Thus, the transmitter can overload, automatically be restored to operation, and yet these relays will stay lit. This permits the operator to understand that the transmitter had overloaded and at which circuit the overload had occurred. The application of switch S6 restores the overload relays to a non-lit condition.

SECTION III

INSTALLATION INSTRUCTIONS

Step #1

Remove the transmitter from their packing cases and observe that no Physical damage has occurred to the equipment in shipment. If any exists, please contact your transportation agent and CCA.

Step #2

Refer to the instruction book on the driver cabinet (FM-3000D/DS) and follow the installation instructions described save for those associated with the output RF connections.

Step #3

Install the amplifier cabinet to the right of the 3KW driver when viewing the transmitter from the front. Connect a substantial ground strap (3 - 4" width) between the cabinet mounting rail and a known station ground.

Step #4

Refer to Drawing #A18, 318 and using the (2) two, 1 5/8" elbows and short section of 1 5/8" line provided interconnect the output of the 3KW driver and the input connection of the 25KW amplifier.

Step #5

Refer to Drawing #A18, 319 and install the high voltage transformer, H. V. choke, and H. V. filter choke that were removed for shipment. The front bottom panel of the amplifier may be removed to assist in the installation of the components on the base. Connect the harness with the cabinet to the terminals of the H. V. transformer. The H. V. filter choke, and the H. V. filter capacitor. Their wires are marked with tags that agree with the appropriate terminals on the components. After the parts are installed on the base, return the front cover to its position.

INSTALLATION INSTRUCTIONS CONT'D

Step #6

Open the front door and observe the control panel. Install the following parts in the front panel that were removed in shipment:

Description	Symbol #
1 Sec. Time Delay Relay 115VAC	K4, K6, K9
60 Sec. Time Delay Relay 115VAC	K8
120 Sec. Time Delay Relay 230VAC	K1
DPDT Relay 115VAC	K2, K3, K5, K7, K14,
DPDT Relay 115VAC with neon lamp	K11, K13

Step #7

Remove the front and back covers from the PA and remove all tape and paper used in shipment. Investigate all components within the PA to verify that none of the mounting hardware became loose in shipment. Restore the PA covers in position.

Step #8

Install the 3 1/8" elbow, harmonic filter and directional coupler supplied with the equipment on the output flange of the power amplifier.

Step #9

Connect the transmission line to the output of the directional coupler. The transmission line connector should connect a gas stop since the PA is designed to be air tight. In addition, the transmission line should be terminated with a 50 ohm load at the transmitters operating frequency. (This load could be the pretuned antenna).

SECTION III

Step #10

Connect the directional coupler to the main cabinet by using the cables taped to the cabinet top. In addition, connect the DC output of the input directional coupler to the power output meter of the driver unit. These wires are normally taped to the top of the driver cabinet and can be fed through the top of the PA and connected to the appropriate terminals on the PA input directional coupler.

Step #11

Turn all of the circuit breakers to OFF. Then connect 208/230 volts, 3 phase to the main input terminal block on the base of the cabinet. Access to these terminals may be through the rear edge on the base.

THE INSTALLATION HAS NOW BEEN COMPLETED.

SECTION IV

TUNING PROCEDURE

Step #1

Interconnect the amplifier with the driver by connecting two wires from the terminal TB2-14 & 15 in the amplifier to TB6-17 & 18 in the driver unit.

Step #2

The driver cabinet should be turned ON in accordance with its tuning instructions, however its plate voltage should not be applied.

Step #3

Turn ON the main, control and fialment circuit breakers in the amplifier cabinet.

Step #4

Turn ON the filament switch, the start relay will close, the blowers will operate, and after adequate pressure has been achieved the air interlock light will register. The filament light will also register, and assuming the cabinet rear door, front PA cover, and bottom panel are secure, the 2nd interlock light will register.

Step #5

After two minutes the ready light will register. Keep the "High-Low" switch in the "Low" position. Keep the "driver by pass" switch in the "Off" position. (This will prevent the application of driver plate voltage until the PA plate voltage is "On".)

SECTION IV

Step #6

Turn the PA plate voltage "On". The PA plate voltage light will register, the PA plate voltmeter will register approximately 4800 volts and the PA plate current will indicate approximately 150 ma.

Step #7

Keep the driver "High-Low" switch in the "Low" position with the power output control in the "minimum" position. Turn the driver plate voltage "On". Refer to the REF position associated with the output of the driver cabinet and the PA cathode current meter. Quickly adjust the PA input tuning and loading controls to achieve the maximum PA cathode current with a minimum REF reading on the driver output meter.

Step #8

Observe the PA output meter and adjust the PA output tuning and loading controls for a maximum power output consistent with minimum PA plate current.

Step #9

Open the front door and change the INC-REF switch located below the meter panel to the "REF" position. If any substantial indication exists - quickly turn OFF the plate switch. This reflected power indicates a mis-termination and the transmitter load must be investigated before any further power is applied. If no significant reflected power exists, turn the switch to the "INC" (Incident) position and continue with the tuning procedure.

SECTION IV

Step #10

Turn the "High-Low" switch to "High". Within one second the high voltage on the PA will be approximately 7500 volts.

Step #11

Observe the power output of the PA and increase the RF drive from the driver cabinet until the desired output power is achieved. If more drive is required, change the plate switch on the drive from "Low" to "High".

Step #12

Adjust the PA input tuning and loading controls to achieve the minimum reflected power to the driver.

Step #13

Readjust the PA output tuning and loading controls to achieve maximum power output consistent with minimum plate current.

Step #14

Compare the readings obtained with those supplied in the test data sheet. They should be similar.

Step #15

Adjust the power output control located on the control panel to obtain the desired power output. The resultant output power should correspond with the test data supplied with the equipment.

Step #16

Keep the transmitter in this condition for approximately one half hour and during this period, occassionally adjust the PA tuning and loading controls

Step #16 cont'd

to obtain a stable condition whereby rated power output is achieved with efficiency. After 30 minutes of operation, the equipment should become stable, the settings of the controls should represent permanent conditions.

Step #17

Turn the PA plate and filament switches to OFF. Due to the design of the control ladder of the PA under this condition, the PA blower will remain on, thus it will provide "after cooling" for the transmitter. After five minutes the PA and driver filament switches can be turned OFF. It should be noted that the equipment utilizes ceramic tubes, which do not require "after" cooling, but, assuming that time is available it is reasonable to provide some "after cooling" to the equipment.

The equipment has now been tuned RF wise. In order for the transmitter to operate with audio, refer to the 3KW driver cabinet data.

IT IS RECOMMENDED THAT IN NORMAL OPERATION, THE TRANSMITTER BE TURNED ON AS FOLLOWS:

Keep the line circuit breaker of both cabinets "ON"; Low-High switches in the "operate" condition, driver cabinet plate switch ON, drive by pass switch OFF.

TO TURN ON TRANSMITTER:

Step #1 - Turn "start" switch ON in driver cabinet.

Step #2 - Turn "PA filament" switch ON in driver cabinet.

Step #3 - Turn PA filament switch ON in PA cabinet.

Step #4 - Keep transmitter in this condition for approximately five minutes and turn "start" switch OFF.

SECTION IV

NOTE #1

The transmitter incorporates a front panel control, on the PA box which controls the filament voltage to the power amplifier tube. This control should be turned counter-clockwise until the power output indication on the front panel shows evidence of decreasing. At this point the voltage should be increased to achieve the original value of output power.

With new tubes, the filament control will not affect the power output and thus, the control should be set in its maximum counter-clockwise condition.

As the tubes ages, the control should be turned clockwise to increase the filament voltage. Following this technique, the tube life of the PA tube can be substantially increased. It is not unusual to experience 10,000 to 20,000 tube life on the 3CX15000A7, when used in the CCA FM-25,000DS.

NOTE #2

All meter panels are hinged and can be opened by firmly gripping the aluminum bottom trim and pulling upward. An interlock is related to each panel. However, extreme caution should be used when opening these panels. Do not do so when the line voltage is applied to the cabinets.

NOTE #3

A calibrated potentiometer is located on the bottom of each meter panel which has been used to calibrate the front panel power output meter of each cabinet. Do not touch this control unless the transmitter is terminated with a calibrated wattmeter.

SECTION V

REMOTE CONTROL

The CCA FM-25, 000DS has been designed with remote control in mind. Thus, all FCC metering and control functions are available in the equipment without the necessity of adding additional parts save for a motor driven rheostat.

In order to operate by remote control, refer to the 3KW instruction book for the driver cabinet. For the PA cabinet do the following: Keep all the switches within the cabinet in their normal positions save for the switch which should be switched to the "remote" position.

The actuation of the "remote" switch disconnects the controls of the main control panel from the circuit. The equipment may then be operated as follows:

TO TURN ON PA FILAMENTS

The remote control system must connect a short between terminals 1 and 2 of terminal board TB2. (Located on cabinet of left side when viewed from rear.)

TO TURN ON PLATE

The remote control system must connect a short between terminals 5 and 6 of terminal board TB2.

TO RESET OVERLOAD

Interrupt the connection between terminals 3 and 4 of terminal board TB2.

SECTION V

TO METER PA PLATE VOLTAGE

Measure the voltage between terminal 11 of terminal board TB2 and ground.

TO METER PA CATHODE CURRENT

Measure the voltage between terminal 12 of terminal board TB2 and ground.

TO METER POWER OUTPUT

Use optional diode detector supplied by CCA.

TO RAISE AND LOWER POWER OUTPUT

Install CCA-MR-1D, Motor Driven Rheostat in driver cabinet as described in driver instruction book.

TO REMOTE CHANGE HIGH TO LOW POWER

Connect normally closed contacts to terminals 7 and 8 of TB2. Open contacts - low voltage will result.

SECTION VI

MISCELLANEOUS CONTROLS

There exists within the FM-25, 000D several controls that are pre-adjusted at the factory and, in general, do not require readjustment. These are presented below for completeness:

EXCITER CONTROLS

See instruction book on exciter.

PA

R23 - This control is located on the bottom of the meter panel and is used to calibrate the output meter. It is generally calibrated when the transmitter is terminated with a known power meter. It is normally provided to the customer precalibrated and there is no requirement for readjustment unless there is a serious doubt in the mind of the customer that the power output meter is not reading properly. Generally, as long as the power output meter and the associated transmitter readings are consistent with the technical data provided, there is no need to re-examine the calibration of the Watt Meter.

SECTION VII

RECOMMENDED MAINTENANCE

WEEKLY

1. Vacuum door filter on rear door.
2. Check meter readings with data of previous week to verify that there are no tubes which indicated any aging.

MONTHLY

Open the rear door and RF covers and vacuum all of the parts upon which dust may have settled.

SIX MONTHS

Remove filter on rear door. Verify that it is clean. If not, restore with new standard door filter, generally, the filter is reusable and all it requires is a thorough cleaning with a vacuum cleaner.

TWELVE MONTHS

Depending on the economics of the broadcast facility, it may be desirable every twelve months, whether the tubes show evidence of aging or not, to replace the inexpensive tubes in the transmitter. This includes the exciter tubes, the regulator tubes and possibly the 1st IPA. One may want to delay the replacement of the 2nd IPA for eighteen months. The power amplifier tube need not be replaced until it definitely shows signs of aging. This will be evidenced by the slumping off of emission and inability to achieve rated power output. When the tube exhibits these characteristics extended life may be obtained by increasing the filament voltage on the tube.

SECTION VIII

TYPICAL METER READINGS

PA I_k 4.96 Amp

PA Plate Voltage 7500V

PA Plate Current 4.1A

Power Output Inc. 100% = 25,000W

Ref. 0%

SECTION IX

"TROUBLE SHOOTING"

PROBLEM: Power Output Low, All metering save for output indication are normal.

SOLUTION: Readjust PA plate tuning to be sure that PA plate current dip is in the same position as before. If so probable solution solution is defective diode or other component in Power Output metering circuit.

PROBLEM: Power Output Low, PA Plate Current Low, 2nd IPA plate current low, PA Plate Voltage slightly high.

SOLUTION: IPA has lost RF drive. Check 2nd IPA stage.

PROBLEM: PA tuning control is in maximum or minimum position and resonance cannot be obtained in the output circuit.

SOLUTION: Transmitter load (antenna) is not properly matched (50 ohms). This can be observed by substantial reading in "reflected" position of power output meter. A properly tuned antenna can be driven within the tuning range of the transmitter.

PROBLEM: Intermittents in high voltage power supply. (H. V. contactor chattering)

SOLUTION: This generally indicates an instability in the control ladder. A faulty air interlock or an impediment in the air system, or a faulty time delay relay will cause this condition.

SECTION X

PARTS LIST

CCA FM-25000D

Symbol	Description			
BL1 & BL2	Blower, PA			
CB1	Breaker, 3 Phase 230V	125A Line		
CB2 & CB3	Breaker, 1 Phase 230V	10A		
C1	Capacitor, Oil Paper	12 mfd		10KV
C2 to C4	Capacitor, Cer. Feedthru	1000 pf	10%	10KV
C5	Capacitor, Blocker			
C6 to C8	Capacitor, Vacuum	40 pf		7.5KV
C9 to C11	Capacitor, Ceramic	1000 pf	10%	5KV
C12 to C16	Capacitor, Cer. Disc.	.01	20%	1KV
C17	Capacitor, Ceramic	1000 pf	20%	10KV
C18	Capacitor, Cer. Disc.	.01	20%	.1KV
C19	Capacitor, Plastic	.1	10%	10KV
C20 to C25	Capacitor, Ceramic	1000 pf	10%	5KV
C26 & C27	Capacitor,			
DC1	Directional Coupler 20KW			
LPE	Harmonic Filter 20KW 6 1/8 line			
HM1	Elapsed Tuner			
I1 to I7	Indicator Lamp GE #47			
J3	Output Flange 3 1/8"			
J4 & J5	Connector			
J7	Receptacle BNC			
J8	Input Flange 1 5/8"			
K1	Relay, Time Delay 120 Sec.	230V		
K2 & K3	Relay, DPDT 115VAC			
K4 & K6	Relay, Time Delay 1 Sec.	115VAC		
K5 & K7	Relay, DPDT 115VAC			
K8	Relay, Time Delay 60 Sec.	115VAC		
K9	Relay, Time Delay 1 Sec.	115VAC		
K10 & K12	Relay			
K11 & K13	Relay 115VAC			
K14	Relay DPDT 115VAC			

SECTION X

PARTS LIST

CCA FM-25000D CONT'D

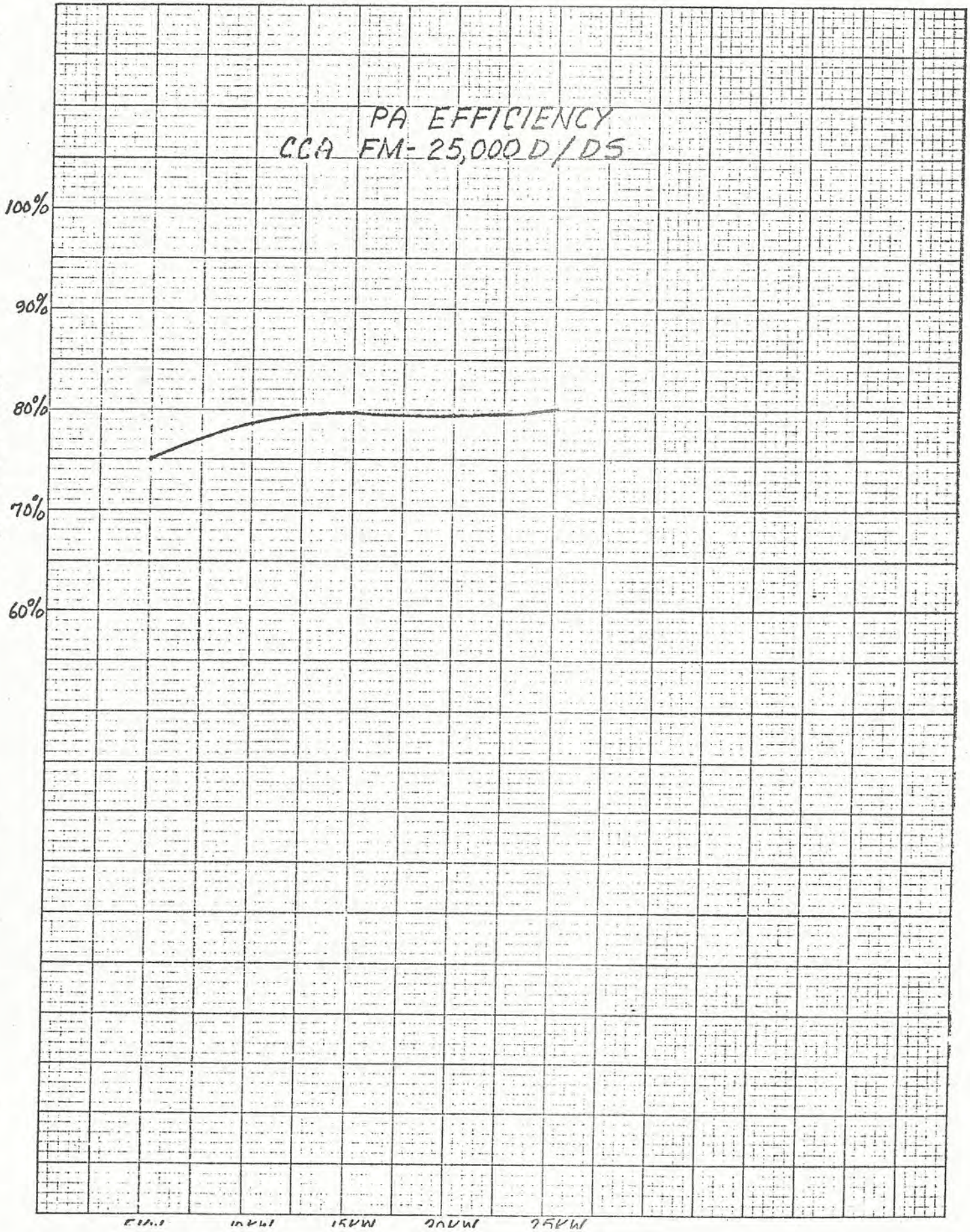
Symbol	Description			
K15 to K17	Relay, 115VAC			
K18	Relay,			
K19	Relay 115VAC			
L1	Inductor, H.V. 2 Hy @ 5A DC 10A			
L2	Inductor, Surge Suppressor 10A			
L3 & L4	Inductor, RF PA Plate 8T			
L5	Inductor, RF PA Plate 16T			
L6 to L8	Inductor, Variable			
L9 to L11	Inductor, PA			
L12 & L13	Inductor, PA 6T #8			
L14	Monitor Loop			
M1	Meter, Line 0-300VAC			
M2	Meter, Fila. 0-10VAC			
M3	Meter, PA Ik 0-6 Amps			
M4	Meter, PA Volts 0-8KV			
M5	Meter, PA Ip 0-6 Amps			
M6	Meter, Power Output 0-110% 0-200			
R1 to R7	Resistor, W.W.	800 ohm	5%	25W
R8 & R9	Not Used			
R10 to R14	Resistor, W.W.	1 ohm	5%	2W
R15	Resistor, Film	8 Meg ohm	2%	30W
R16	Resistor, Comp.	100K	10%	2W
R17	Resistor, Comp.	3.9K	10%	2W
R18	Resistor, W.W. Rheostat	5 ohm	5%	100W
R19	Resistor, W.W.	5 ohm	10%	200W
R20 to R21	Resistor, W.W.	5 ohm	5%	200W
R22	Resistor, W.W. Adj.	5 ohm	5%	200W
R23	Resistor, Potentiometer	10K	10%	2W
R24	Resistor, Comp.	2.7K	10%	2W
R25 to R35	Resistor, W.W.	1 ohm	1%	2W
R36	Not Used			
R37	Resistor, W.W.	20K ohm	5%	50W
R38 to R41	Resistor, W.W.	100K	5%	200W
R42	Resistor, W.W.	5 ohm	5%	200W
S1	Switch, Rotary 2P 5 Pos.			
S2 to S4	Switch, SPST			

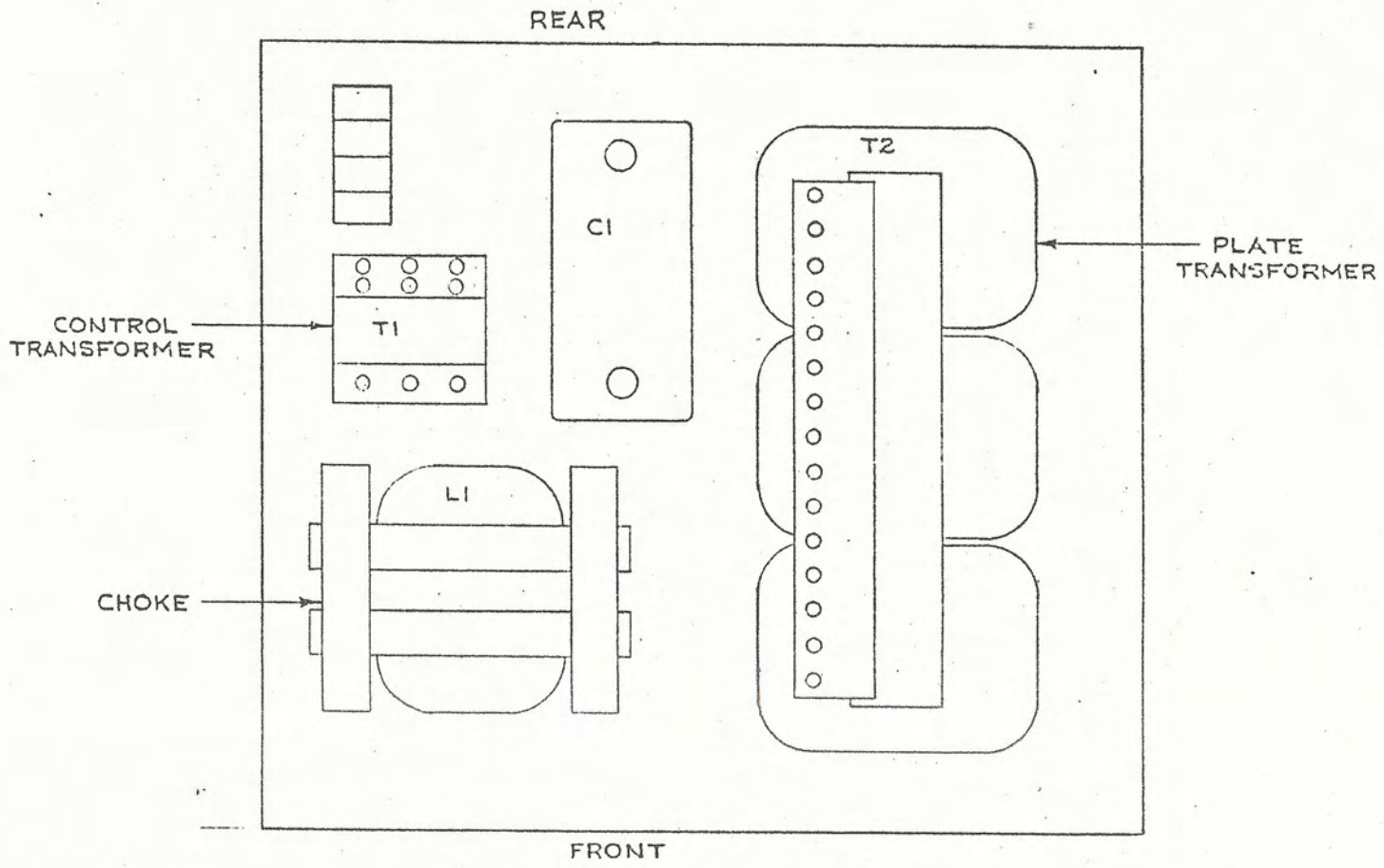
SECTION X

PARTS LIST

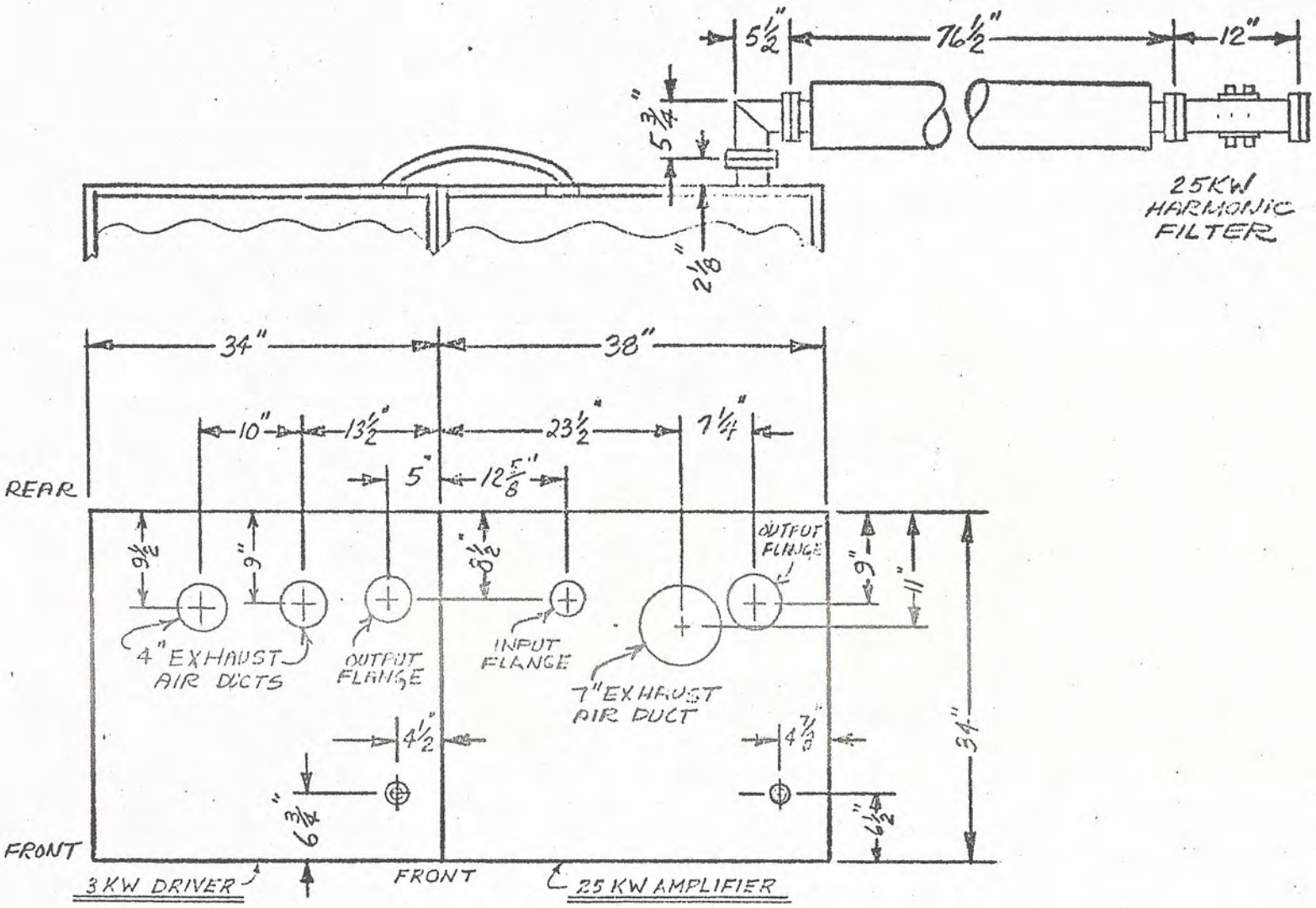
CCA FM-25000D CONT'D

Symbol	Description
S5 & S6	Switch, SPST Mom. ON
S7	Switch, 400L 2 Pos.
S8	Switch, SPST
S9	Switch, Air
S10 to S14	Switch
T1	Transformer Control
T2	Transformer Plate
T3	Transformer PA fila.
TB1	Terminal Board 4 terminals
TB2	Terminal Board 20 terminals
TB3 & TB4	Terminal Board 16 terminals
V1	Tube
XV1	Socket
XI1 to XI7	Socket Indicator Light
XXI1 To XXI2	Lens - Blue
XXI3	Lens - Green
XXI4	Lens - Orange
XXI5	Lens - Red
XXI6	Lens - White
XXI7	Lens - Yellow
Z1 to Z6	Rectifier Stock, H. V. 16KV PIV @ 20 Amps



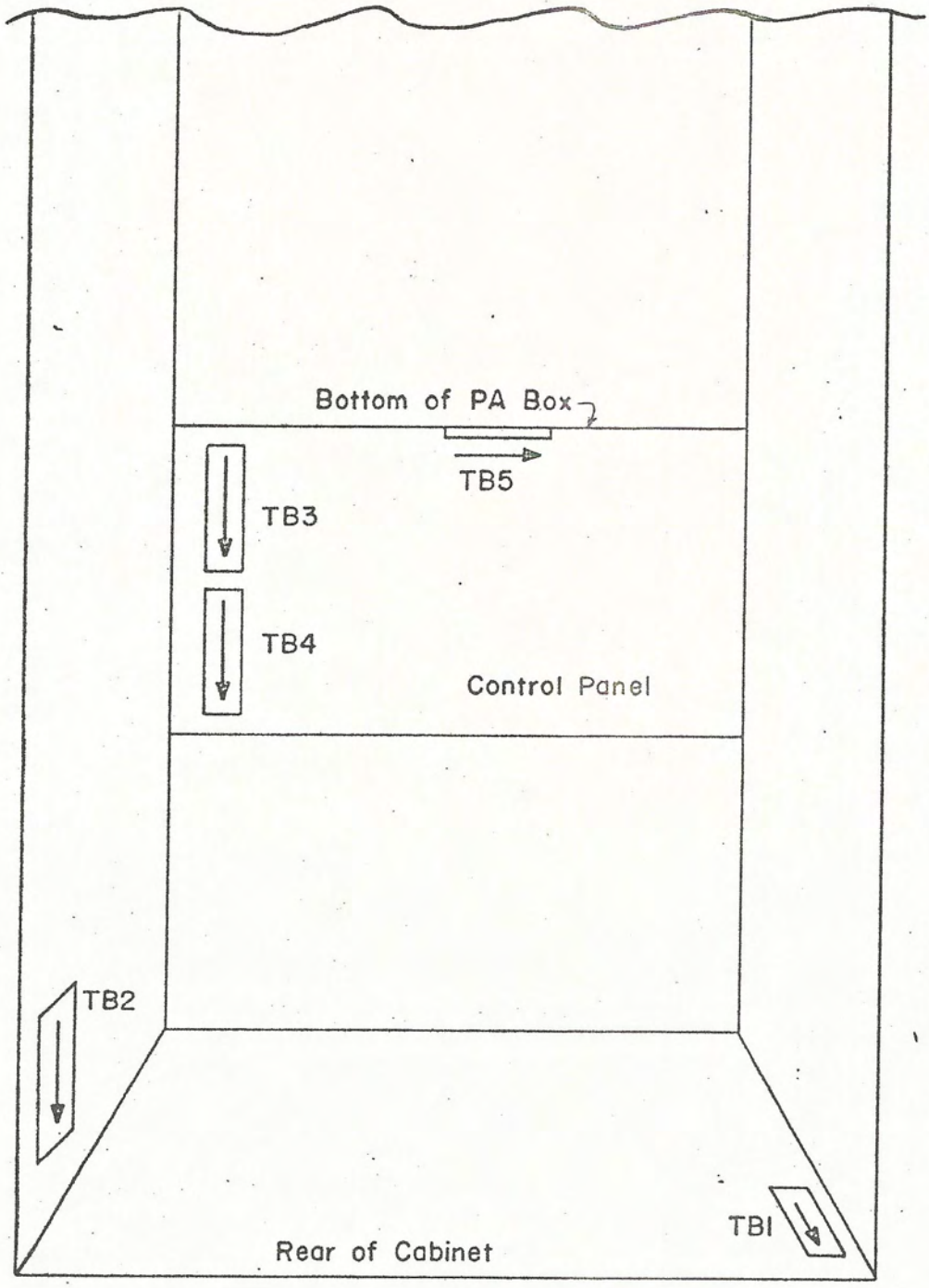


FM 25 KW AMPLIFIER - CABINET BASE



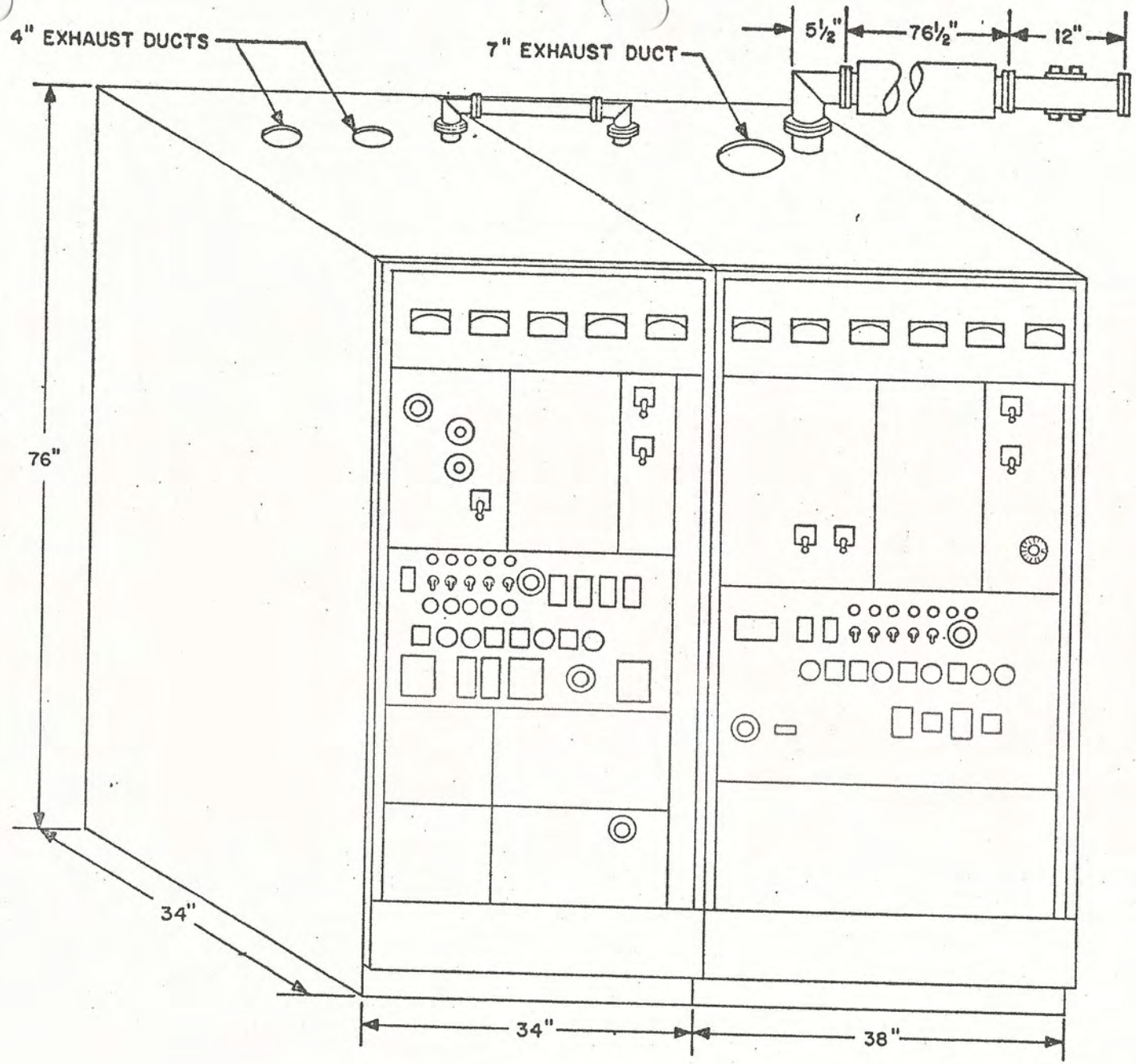
TOP VIEW FM-25,000DS TRANSMITTER

A18, 318



TERMINAL BOARD LAYOUT

FM 25 KW AMPLIFIER



CABINET OUTLINE – FM25KW

A18,317

POWER LINE
3Ø 230V
50/60C
TB1
PLATE
CB1
CONTROL
CB2
FILAMENTS
CB3
T1
T2
S1
LINE
FIL
S2
REMOTE FIL.
BL1
BL2
M1
Z1 TO Z6 EACH CONSISTS OF
28 DIODES 400V PIV 20AMP
28 CAPACITORS .01μF 20% 1KV
28 RESISTORS 47K 10% 1W
L1
2H 5AMPS
C1
12MFD
10KV
R38
100K
200W
R39
100K
200W
R40
100K
200W
R41
100K
200W
R9
5K
10W
R37
20K
50W
C19
.1
10KV
R15
(B-1M
2W RES)
R16
100K
2W
PLATE VOLTS
M4
C12
.01
R17
3.9K
2W
R10
R11
R12
R13
R14
2W
L2
M5
C13
.01
L3
L4
L5
C2
100pF
15KV
C3
100
15KV
C4
100
15KV
C28
100pF
15KV
C5
CCA
PA
V2
3CX15,000A7
J8
C17
460
30KV
PA TUNING
L6
LOADING
L7
C8
F.D.
C7
FD
C6
FD
C20
C21
C22
C23
L12
L13
C24
1000
5KV
C25
1000
5KV
M2
T3
C9
1000
5KV
C10
1000
5KV
LOADING
L10
L9
L11
TUNING
L8
J3
HARMONIC FILTER
LPF
DIRECTIONAL COUPLER
DC1
J6
J4
J5
J7
L14
MONITOR OUTPUT
LOC
REM
INC
REF
S8
C18
.01
M6
OUTPUT
R23
50K
R42
5Ω
200W
C11
1000
5KV
R19
5Ω
200W
R20
5Ω
200W
R21
5Ω
200W
*NOTE: FOR REMOTE POWER MONITORING CONNECT TO TB2-13 AND TB2-14.
R18
5Ω
150W
R36
250
C14
.01
M3
PA
IK
R25
R26
R27
R28
R29
R30
2W
1%
TB2
TB3
S5
OL RESET
REMOTE
RESET
REMOTE INTERLOCK
S4
PLATE
REMOTE PLATE
REMOTE HI-LO POWER
LO
HI
S7A
S7B
S7C
S7D
S3
LO-HI
BOTTOM FRONT S13 PANEL
S12
CABINET BACK DOOR
S11
METER PANEL
K10
HV OL
K12
PA OL
R31
R32
R33
R34
R35
TB4-8
TB4-9
R22
5Ω
200W
S6
OL INDICATOR RESET
(N.C. SPRING RETURN)
K11
K13
OVERLOAD INDICATOR RELAYS
K18
K17
L0
TB4-7
HV OL
K16
FILAMENT
K15
START
S9
FIL
TB4-1
TB4-2
PA BOX
S10
C26
1000
C27
1000
TB4-3
K1
TD
120 SEC
TB4-5
TB4-6
K14
HI-LO
K9
1 SEC
TD
K19
K2
OL AUX
S14
TB4-16
TB4-10
TB4-11
TB4-12
TB4-13
TB2-10
TB2-16
TO REMOTE INTERLOCK IN 3KW ; TEL 57A 10
K3
1ST
OL
HOLD
K4
TD
1 SEC
K5
2ND
OL
HOLD
K6
TD
1 SEC
3RD
OL HOLD
K7
K8
OL CLEARING
60 SEC
3 CYCLE OVERLOAD RECYCLE SYSTEM
R1
800Ω
25W
I1
FIL
R2
800Ω
25W
I2
AIR INTERL'K
R3
800Ω
25W
I3
DOOR INTERL'KS
R4
800
25W
I4
READY
R5
800Ω
25W
I5
LOW POWER
R6
800Ω
25W
I6
PLATE
R7
800Ω
25W
I7
OL
NOTE
1. RINGED NUMBERS IN ITALICS ARE USED TO INDICATE NUMBER BANDS ON WIRES ⑩
REVISIONS
No
Date
By
1
7-24-70
B.GEL.
2
12-3-70
JCh
3
3-10-72
BG
4
3-31-72
R.A.
5
10-4-73
DJS
CCA ELECTRONICS CORPORATION
FM-25,000 DA - 25KW FM AMPLI.
SCHEMATIC DIAGRAM
Used on: FM-25,000DS TRANSMITTER
Drawn By DJS
Date 5/70
Approved
Date
Drawing No.
D-40,093
STEAM POWERED RADIO.COM

MULTIMETER SWITCH (S8)		
POS	FUNCTION	FSD
1	IPA I_K	500MA
2	IPA E_b	4KV
3	PA I_K	2A

REVISIONS		
No	DATE	BY
6	3-24-77	D.J.S.
7	5-18-78 7000-19	JLB KH
8	11-15-82 TB4-11	MAD
9		
10		

REVISIONS		
No	Date	By
1	12/18/75	D.J.S.
2	4/5/76	D.J.S.
3	6/7/76	D.J.S.
4	8/19/76	D.J.S.
5	10/8/76	D.J.S.

CSI ELECTRONICS INC.

FM BROADCAST TRANSMITTER
SCHEMATIC DIAGRAM

Used on: FM - 3KW

Drawn By D.J.S. | Date 6-75 | Drawing No. C 34017

Approved | Date SHEET 1 of 2